sporadic cases of kala-azar. *P. papatasi* also transmits sandfly fever, which is endemic throughout this region.

Lice. The human lice, *Pediculus humanus corporis*, *P. humanus capitis* and *Phthirus pubis*, infest the inhabitants in some of the poorer urban and rural communities. *P. humanus corporis* is the vector in occasional outbreaks of louse-borne typhus and louse-borne relapsing fever.

Fleas. The human flea, *Pulex irritans*, and the rat and the dog fleas, *Ctenocephalides felis felis* and *C. canis*, are common. The rat flea, *Xenopsylla cheopis*, infests the domestic and the wild rodents, and is implicated in the transmission of sporadic cases of murine typhus and plague. *Xenopsylla cheopis* is indigenous in Palestine, and probably occurs throughout the coastal area, where it is a potential vector of plague.

Bedbugs. The bedbug, *Cimex lectularius*, is an annoying pest in all sections of the country.

Ticks and Mites. Numerous species of ticks infest the livestock. The dog tick, *Rhipicephalus sanguineus*, is widespread. It has been implicated in the transmission of cases of Mediterranean spotted fever. *Ornithodoros tholozani* is found in certain isolated localities, and is probably the vector in a few recognized cases of tick-borne relapsing fever.

The human itch mite, *Sarcoptes scabiei*, is widely distributed. It was exceptionally prevalent during the war years 1941-45. The grain itch mite, *Pediculoides ventricosus*, is plentiful in the grain-producing districts. It produces a troublesome rash when it attacks man.

Scorpions and Spiders. Species of *Buthus* and *Scorpio* are sometimes seen, particularly in the interior, but serious cases of scorpion sting apparently are unusual. The poisonous black spider, *Latrodectus tredecimguttatus*, is reported from Syria and Israel, and may exist in adjacent portions of Lebanon.

Reptiles. Poisonous snakes are relatively rare, but the vipers, *Vipera lebetina leb-*

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944 organization in Beirut and of the government authorities in other parts of the country. Shops dispensing foods are required to have a permit, but the enforcement of sanitary regulations is lax in many towns and villages. Although the law provides for the registration of food handlers at 3-month intervals, the routine examinations are often cursory and of little value. The establishments are inspected from time to time, not only by the health officers, but also by agents of the Lebanese tourist department.

Most animals are inspected, before and after slaughter, by veterinary officers in the municipal abattoirs in Beirut and the principal cities. There is no regular supervision, however, of the meat supplies in the rural areas. A large percentage of the meat used in Lebanon is imported from Syria or Turkey, and is not subject to routine inspection locally.

944 There are two small pasteurization plants 2.346 in Beirut which process limited amounts of 1649 milk, butter and cheese. Although the plants 2.32 are supervised by the municipal authorities, no control is exercised over the sanitary quality of the raw product. Pasteurized milk is bottled; all other milk is sold in bulk. Milk is customarily boiled before use in each household, but butter and cheese are potential sources of human infection. Brucellosis is endemic among the cattle and the goats. The extent of bovine tuberculosis is not known.

HEALTH SERVICES AND MEDICAL FACILITIES

Ministry of Health

949 The public health organization which had evolved before Lebanon became an independent republic in 1943 was reorganized in 1953, and its responsibilities were defined by law. At that time, its name was changed from that of Ministry of Hygiene and Public Assistance to the Ministry of Public Health. The Ministry, which has its headquarters in Beirut, is administered by a Minister of Public Health who is assisted

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in the Bekaa they averaged less than 1 per cent.

Schistosomiasis. Schistosomiasis apparently is not endemic, but the infection has been demonstrated among Palestinian refugees living in camps near Tyre. In the examination of urine specimens from 15 boys, from 6 to 12 years of age, in a school at Tyre in 1950,[9] the eggs of *Schistosoma haematobium* were found in 47 per cent. A second series of urine samples, taken a few months later from 25 refugee boys, from 7 to 14 years of age, revealed eggs in 16 per cent. All the boys came originally from the Haifa and the Acre regions in Palestine. The infection was still localized in 1951, as shown by the fact that urine specimens from 1,000 boys enrolled in different schools in the the same camp were completely negative for *S. haematobium*.[10] No evidence of infection has been found in the course of limited surveys among Lebanese children in the vicinity of Tyre, and the disease was formerly unknown in the local population.

The intermediate snail host, *Bulinus* [illegible], inhabits streams and irrigation canals near Tyre and Sidon, and has been collected from one farm in the middle reaches of the Litany River. It is feared that the disease may become established and spread in the irrigated districts of the coastal plain between Tyre and Sidon.

Taeniasis. Three outbreaks of trichinosis have been recorded—in 1894, 1939-40 and 1941. The second outbreak occurred in Beirut district, where most of the pig farms are concentrated. The number of recognized human cases was small, but in the examination of about 1,000 pigs on several farms in the neighborhood of the slaughterhouse, 15 to 26 per cent were found to be infected with *Trichinella spiralis*. A high rate of infection was also discovered among rats trapped in the area. The mass slaughter of the pigs on the affected farms and the incineration of infected carcasses were ordered by the health authorities. In the 1941 outbreak, 30 human cases, with 2 deaths, were reported, all traceable to infected meat from

a single farm near Zahle. The rate of porcine infection probably totals less than 2 per cent under normal conditions. Pork is consumed only in Christian households, and human cases are seldom observed.

Other Helminth Infections. Infection with one or more species of intestinal worms is prevalent among both rural and urban populations. Ascariasis is widely distributed, with the lowest infection rates in the cultivated areas of the coastal plain between Beirut and Sidon and the highest in the Bekaa. The infection, which is more frequent among children than adults, probably averages 25 to 50 per cent in the country as a whole. Enterobiasis and trichuriasis are common, but strongyloidiasis is relatively rare.

Taeniasis, caused by the beef tapeworm, *Taenia saginata*, is second to ascariasis in prominence. The infection rates range from 5 to 15 per cent in different localities, but are highest in the vicinity of towns and cities, where the consumption of beef exceeds that in the rural villages. The use of raw meat in the preparation of the popular national dish, *kubbi*, is a factor in the spread of the disease. Infection with the pork tapeworm, *T. solium*, is sometimes seen in the Christian communities. The dwarf tapeworm, *Hymenolepis nana*, is encountered occasionally, especially in children.

Echinococcosis is sporadic. The prevalence of the disease in the general population is not known, but it apparently is far from negligible. According to the records of the American University hospital in Beirut, 140 persons, mainly from Lebanon and Syria, were treated for hydatid disease in the 22 years 1926-48. The rate of canine infection is high throughout most of this region. The examination of 237 stray dogs, collected on the streets of Beirut in the summer of 1948,[9] revealed that about 21 per cent harbored adult forms of *Echinococcus granulosus*. Surveys have also demonstrated the presence of hydatid cysts in a large percentage of the meat animals slaughtered in the abattoirs in Beirut. In

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1934-35, infection was detected in 22 per cent of 1,156 sheep and goats examined and in 45 per cent of 201 cattle.[48] The degree of infection varies, as shown by the subsequent investigation in 1948,[49] in which cysts were found in 7 to 12 per cent of 2,600 sheep carcasses examined, in 47 per cent of 514 cattle and in 67 per cent of 34 camels. The presence of a greater preponderance of cysts with viable scolices in the sheep carcasses, coupled with the fact that mutton is used more extensively than beef, suggests that sheep represent the chief reservoir of infection. Infection with the liver flukes, *Dicrocoelium dendriticum* and *Fasciola hepatica*, is frequent among the sheep and other domestic animals, and cases are seen occasionally in man.

Brucellosis. Brucellosis is enzootic among the cows and the goats. Little raw milk is used, but sporadic human cases result from contact with infected animals or from the consumption of contaminated cheese and butter. In an investigation conducted in the bacteriologic laboratory of the American University hospital in 1948,[50] agglutination tests were performed on 1,370 samples of whey from the milk of animals in localities where the existence of the human disease was suspected. A positive agglutination reaction was obtained in 17 per cent of the samples of milk collected from 206 cows in Beirut and in 22 per cent from 162 cows in Mashghara, a village in the Mount Lebanon area. Similarly, positive reactions were observed in 15 per cent of the milk samples from 330 goats in Beirut, in 26 per cent from 82 goats in Tripoli and in 16 per cent from 190 goats in Lakhish, in the mountains between Beirut and Tripoli. Four strains of *Brucella abortus* and 6 of *Br. melitensis* were isolated from the milk samples; 2 each from the cows in Beirut and Mashghara and from the goats in Beirut, Tripoli and Lakhish. Evidence of persistent human infection was indicated by the results in a series of agglutination tests on blood serums from 640 patients registered in the hospital and the clinics of the

American University in Beirut. About 6 per cent gave a positive reaction with *Br. abortus* and *Br. melitensis*. Sporadic cases of infection with *Br. suis*, as well as with *Br. abortus* and *Br. melitensis*, are diagnosed in the course of routine serologic examinations in the Institute de Bactériologie of the Faculté Française de Médecine.

Other Infections. Food poisoning caused by the consumption of cheese and other foods contaminated with toxic strains of *Staphylococcus* is common.

Diseases Spread Chiefly Through the Respiratory Tract

Tuberculosis. Tuberculosis is prevalent, but the extent of infection is not accurately known. In the 6 years 1943-48, the reported deaths from tuberculosis averaged 254 a year, or roughly 21 per 100,000 population. The validity of such mortality statistics is questionable, however, due to the deficiencies in reporting and the tendency to conceal the presence of infection.

Several tuberculin test surveys have been made on small selected groups of the population, but with considerable variation in results. In 1949, the first representative survey was undertaken in Beirut and the surrounding suburbs by the Ministry of Public Health, in co-operation with the United Nations International Children's Emergency Fund and associated organizations. From October, 1949, to the middle of March, 1950, tuberculin tests were performed on a voluntary basis on about 43,000 individuals of all ages, 29,500 of whom were subsequently inoculated with BCG vaccine. The proportion of persons giving a positive reaction to tuberculin was estimated at 14 to 22 per cent. Among the schoolchildren, who comprised the largest group, the reaction rate averaged 5 per cent at 6 years of age and 17 per cent at 18 years of age. A comparable series, made up of the persons attending a testing center in one of the poorer districts of Beirut, showed 7 per cent positive reactions among children 6 years of age and 26 per cent at 18 years of age.

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Other Infections. Canine rabies is common, and human cases are observed from time to time. In each of the 4 years 1947-50, from 469 to 621 persons from Lebanon and Syria received prophylactic treatment for the prevention of rabies at the Institut Antirabique of the Faculté Française de Médecine at Beirut. Either the Semple or the Fermi type of vaccine was employed. From 2 to 6 deaths were recorded each year, usually among individuals who had been bitten by wild animals or who had delayed treatment. About 75 per cent of the persons registered within this period were bitten by dogs and 20 per cent by rats; the remainder by cats, wolves, hyenas and other animals.

[NLS]

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Anthrax is enzootic among the sheep, and human infections occur occasionally. Sporadic cases of rat-bite fever are recorded.

Leptospirosis is not reported, but the infection is known to be enzootic among the local rats. Using a combination of staining, darkfield illumination and culture technics, *Leptospira icterohaemorrhagiae* was demonstrated in 8 out of 65 specimens of *Rattus norvegicus* trapped in Beirut in 1945.[33] Five rats of the species *R. rattus alexandrinus* were studied at the same time, but none was found to be infected.

Diseases Spread by Arthropods

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Malaria. Malaria has long been a disease of major health and economic importance in Lebanon. As a result of anopheline control programs, it has recently dropped from first to second place among the disease problems of the country. Nevertheless, at least one fifth of the inhabitants live in endemic or hyperendemic regions, and are potentially exposed to infection each year. The trend over the last decade has been downward; the official statistics suggest that the peak of prevalence occurred in 1942-44, coincident with the military operations in the area and the influx of persons from other countries. The recorded cases, which represent a small fraction of the total, diminished from over 21,000 in 1943